

High Performance EVA Gloves (HPEG)

Completed Technology Project (2014 - 2017)



Project Introduction

In collaboration with HEOMD's Human Research Program, we are researching mechanisms for hand injury and will be developing new gloves to significantly reduce injury and improve performance, including mobility and glove life.

Anticipated Benefits

NASA funded: Ultimately the first "mission use" will be integration with advanced space suits under development by NASA's Advanced Exploration Systems Program. Although not an official "customer", the International Space Station could benefit from this technology if its operational life is extended. New gloves developed by HPEG could be evaluated and eventually used on the International Space Station. **NASA unfunded:** HPEG gloves are an enabling technology. They are under development to meet requirements for a broad set of future exploration missions and are baselined for advanced spacesuits under development by NASA. For the near-Earth "Proving Ground", HPEG gloves could be used with space suits during a possible asteroid redirect mission or return missions to the Moon. They have enhanced anti-dust capabilities. For "Earth Independent" missions such as deep space including human missions to Mars, the gloves could be employed both for transit and surface phases. **OGA:** There may be benefits to the Department of Defense for use in military operations, such as high altitude flight suits, paratroopers and special operations. **Commercial:** This technology may benefit commercial space industry for those companies with interest in Space Commercialization for Lunar and Mars missions. **Nation:** This technology will benefit the nation by enabling human return to the Moon and missions to Mars, and thus benefits may include the excitement, national pride, economic spinoffs, and scientific return that these missions may offer.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Game Changing Development

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Primary U.S. Work Locations and Key Partners

Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
David Clark Company Incorporated	Supporting Organization	Industry	Worcester, Massachusetts
Final Frontier Design	Supporting Organization	Industry	Brooklyn, New York
ILC Dover	Supporting Organization	Industry	Newark, Delaware
● Space Technology Mission Directorate(STMD)	Supporting Organization	NASA Mission Directorate	

Primary U.S. Work Locations

Texas

Project Management

Program Director:

Mary J Werkheiser

Program Manager:

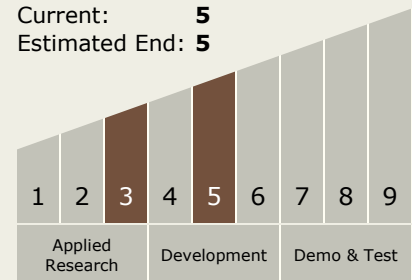
Gary F Meyering

Principal Investigator:

Daniel J Barta

Technology Maturity (TRL)

Start: 3
Current: 5
Estimated End: 5



Target Destinations

Earth, Mars

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Project Transitions



January 2014: Project Start



September 2017: Closed out

Closeout Summary: After developing an extensive suite of test protocols, the EVA Glove project developed, fabricated and tested new gas pressurized glove designs from two separate vendors. The new gloves were tested against flight glove designs and several of the innovative features will be infused into the AES glove project as they move forward with the next generation of EVA gloves. In addition, the team developed and assessed mechanical counter pressure gloves and mechanical assist gloves which offer a high risk/high reward alternative to traditional gas pressurized gloves. To thoroughly assess these new glove designs a set of sensors was developed to better understand glove performance and how injuries occur. The objective of the NGLS HPEG Element was to advance space suit glove technology to facilitate future exploration missions. Primary goals included improving glove performance, increasing glove durability and reducing glove injury. The project delivered two prototype glove pairs from ILC, a prototype glove pair from DCCI, a robotic assist prototype glove pair, a mechanical counter pressure prototype glove pair, and a sensor glove system. In addition the project generated extensive quantifiable test procedures which were used to assess the gloves. Tests showed the HPEG gloves achieved 4 of 5 of the project performance goals. Glove tactility was below the threshold goal. The EVA Office of the International Space Station Program has initiated a procurement of an EVA glove outfitted with material and fabrication advancements implemented in the HPEG ILC glove design. All glove types advanced in TRL and many innovations will be incorporated in future glove designs. HEOMD - AES

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>